AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-11. (*canceled*)

12. (*currently amended*) A microscope having a microscope beam path and including ~~a~~ light diffracting ~~element~~ means for ~~the separation of~~ separating excitation light and emission light in the microscope beam path and,

detection means for detecting emission light emitted by a sample,

wherein the light diffracting means is so positioned with respect to the beam path and the detection means that only undiffracted light can be detected by the detector means.

13. (*previously added*) The microscope of claim 12, wherein the microscope is a laser scanning microscope.

14. (*currently amended*) The microscope of claim 12, wherein the light diffracting ~~element~~ means is traversed both by the excitation light and the emission light.

15. (*previously added*) The microscope of claim 14, wherein the light emitted by a sample comprises fractions of the excitation light and of wavelength-shifted fluorescence fractions.

16. (*currently amended*) The microscope of claim 12, wherein the light diffracting ~~element~~ means influences at least one excitation wavelength by diffraction, whereas other wavelengths emitted by a sample pass in uninfluenced form through the element and are thereby spatially separated from the excitation light.

17. (*currently amended*) The microscope of claim 13, further including means for switching the light diffracting ~~element~~ means by way of a frequency change from a first wavelength of a first laser to a second wavelength of a second laser.

18. (*currently amended*) The microscope of claim 12, further including at least one optical ~~element~~ means for influencing the light direction provided in at least one of the excitation beam path upstream of the element ~~and/or in~~ and the detection beam path downstream of the element in order to improve light fraction separation.

19. (*currently amended*) The microscope of claim 12, wherein the light diffracting ~~element~~ means comprises an AOTF.

20. (*previously added*) The microscope of claim 12, wherein the optical element means comprises a reflection element.

21. (*currently amended*) The microscope of claim 12, wherein the optical ~~element.~~ means comprises a light refracting element.

22. (*currently amended*) A microscope having a microscope beam path and including ~~a~~ light diffracting ~~element~~ means for ~~the separation of~~ separating excitation light and emission light in the microscope beam path and for regulating the excitation intensity and,

detection means for detecting emission light emitted by a sample,

wherein the light diffracting means is so positioned with respect to the beam path and the detection means that only undiffracted light can be detected by the detector means.

23. (*previously added*) The microscope of claim 22, wherein the microscope is a laser scanning microscope.

24. (*currently amended*) A microscope having a microscope beam path and including a plurality of light diffracting ~~element~~ means for ~~the separation of~~ separating excitation light and emission light in the microscope beam path and for simultaneously or individually feeding in different wavelengths and,

detection means for detecting emission light emitted by a sample,

wherein the light diffracting means is so positioned with respect to the beam path and the detection means that only undiffracted light can be detected by the detector means.

25. (*previously added*) The microscope of claim 24, wherein the microscope is a laser scanning microscope.

26. (*currently amended*) The microscope of claim 24, wherein the light ~~detecting elements~~ diffracting means comprise firstly an AOTF and then an AOM in the direction of ~~the~~ detection.

27. (*currently amended*) The microscope of claim 24, wherein at least one of an AOTF and an AOM are used as the light diffracting ~~elements~~ means.

28. (*currently amended*) A fluorescence microscope comprising:

~~a~~ radiation ~~source (L1, L2, L3)~~ means for irradiating a sample,

~~a~~ detection ~~device (DE, DT, NFT) for the detection of~~ means for detecting emission light emitted by the sample,

microscope optics means for directing excitation light to the sample and for directing emission light back in the direction of the radiation ~~source~~ means and detection ~~device~~ means,

~~an~~ acousto-optical ~~element (AOM, AOTF)~~ means for separating excitation light and emission light, for diffracting the excitation light and ~~with which it is possible to regulate~~ for regulating an intensity of the diffracted excitation light, the acousto-optical ~~element~~ means being positioned between the radiation ~~source~~ means and the microscope optics means in such a way that diffracted excitation light can be introduced into the microscope optics ~~(SC1, SC2, SCO, M1)~~ means, wherein:

the emission light emitted by the sample has fractions of excitation light and fractions of wavelength-shifted fluorescence light,

excitation light emitted by the sample can be deflected in the direction of the radiation ~~source~~ means by the acousto-optical ~~device (AOM, AOTF)~~ means, and

wavelength-shifted fluorescence light emitted by the sample can be transmitted undiffracted through the acousto-optical ~~element (AOM, AOTF)~~ means and is spatially separable from excitation light fractions of the emission light, and wherein:

the detection ~~device (DE, DT, NFT)~~ means is so positioned with respect to the acousto-optical ~~element~~ means that wavelength-shifted fluorescence light transmitted undiffracted through the acousto-optical ~~element (AOM, AOTF)~~ means is detectable by ~~means of~~ the detection ~~device (DE, DT, NFT)~~ means and

the acousto-optical means is so positioned with respect to the beam path and the detection means that only undiffracted light can be detected by the detector means and

further comprising ~~a~~ filter ~~device (LF), which~~ means for ~~the selective detection of~~ selectively detecting wavelength-shifted fluorescence light in the detection ~~device (DE, DT, NFT)~~ means ~~is~~ located between the acousto-optical ~~element~~ means and the detection ~~device (DE, DT, NFT)~~ means.

29. (*previously added*) The fluorescence microscope of claim 28, wherein the fluorescence microscope is a confocal fluorescence laser microscope.

30. (*currently amended*) The fluorescence microscope of claim 28, wherein the radiation ~~source~~ means is a laser emitting excitation light.

31. (*currently amended*) The fluorescence microscope of claim 28, further comprising at least one optical ~~element~~ means for influencing the light direction provided in at least one of an excitation beam path upstream of the acousto-optical ~~element (AOM, AOTF)~~ means and a detection beam path downstream of the acousto-optical ~~element (AOM, AOTF)~~ means for the improved separation of the light fractions.

32. (*currently amended*) The fluorescence microscope of claim 31, wherein the optical ~~element~~ means comprises a reflection element ,~~(S1, S2, PS, S)~~ selected from the group consisting of a mirror ~~(S)~~, a bimirror ~~(S1, S2)~~ and a vapourized prism ~~(PS)~~.

33. (*currently amended*) The fluorescence microscope of claim 31, wherein the optical ~~element~~ means comprises a light refracting element ~~(P)~~ which is located in at least one of an excitation beam path upstream of the acousto-optical ~~element (AOM, AOTF)~~ means and a detection beam path downstream of the acousto-optical ~~element (AOM, AOTF)~~ means.

34. (*previously added*) The fluorescence microscope of claim 33, wherein the light refracting element comprises an unvapourized prism ~~(P)~~.

35. (*currently amended*) The fluorescence microscope of claim 32, ~~further comprising a further~~ wherein the optical ~~element~~ means ~~comprising~~ further comprises a light refracting element ~~(P)~~ which is located in at least one of an excitation beam path upstream of the acousto-optical ~~element (AOM, AOTF)~~ means and a detection beam path downstream of the acousto-optical ~~element (AOM, AOTF)~~ means.

36. (*currently amended*) The fluorescence microscope of claim 35, wherein the light refracting element comprises an unvapourized prism ~~(P)~~.

37. (*currently amended*) A fluorescence microscope, comprising:

~~a~~ radiation ~~source (L1, L2, L3) which emits~~ means for emitting excitation light for irradiating a sample,

~~a~~ detection ~~device (DE, DT, NFT) for the detection of~~ means for detecting emission light emitted by the sample,

microscope optics means for directing excitation light to the sample and for directing emission light back in the direction of the radiation ~~source~~ means and the detection ~~device~~ means,

~~an~~ acousto-optical ~~element (AOM, AOTF)~~ means for separating excitation light and emission light and for diffracting the excitation light and which is positioned between the radiation ~~source~~ means and the microscope optics means in such a way that diffracted excitation light can be introduced into the microscope optics ~~(SC1, SC2, SCO, M1)~~ means, wherein:

the emission light emitted by the sample has fractions of excitation light and fractions of wavelength-shifted fluorescence light,

excitation light emitted by the sample can be deflected in the direction of the radiation ~~source~~ means by diffraction by the acousto-optical device ~~(AOM, AOTF)~~, and

wavelength-shifted fluorescence light emitted by the sample can be transmitted undiffracted through the acousto-optical ~~element (AOM, AOTF)~~ means and is spatially separable from excitation light fractions of the emission light, and wherein:

the detection ~~device (DE, DT, NFT)~~ means is so positioned with respect to the acousto-optical ~~element~~ means that wavelength-shifted fluorescence light transmitted undiffracted through the acousto-optical ~~element (AOM, AOTF)~~ means can be detected by means of the detection ~~device (DE, DT, NFT)~~ means, and further comprising:

the acousto-optical means is so positioned with respect to the beam path and the detection means that only undiffracted light can be detected by the detector means and

~~a~~ filter ~~device (LF), which~~ means for ~~the selective detection of~~ selectively detecting wavelength-shifted fluorescence light in the detection ~~device (DE, DT, NFT)~~ means is positioned between the acousto-optical ~~element~~ means and the detection ~~device (DE, DT, NFT)~~ means, and

at least one ~~light reflecting~~ element ~~(P)~~ for influencing the light direction and for separating the light fractions, wherein the element is selected from the group consisting of reflecting and refracting elements and which is located in at least one of an excitation beam path upstream of the acousto-optical ~~element (AOM, AOTF)~~ means and a detection beam path downstream of the acousto-optical ~~element (AOM, AOTF)~~ means.

38. (*previously added*) The fluorescence microscope of claim 37, wherein the fluorescence microscope is a confocal fluorescence laser microscope.

39. (*currently amended*) The fluorescence microscope of claim 37, wherein the radiation ~~source (L1, L2, L3)~~ means is a laser.

40. (*currently amended*) The fluorescence microscope of claim 37, wherein the at least one ~~light reflecting~~ element ~~(P)~~ for influencing the light direction and for separating the light fractions is an unvapourized prism ~~(P)~~.

41. (*currently amended*) The fluorescence microscope of claim 28, wherein the acousto-optical ~~elements (AOM, AOTF)~~ means comprise firstly an AOM and then an AOTF in the direction of the microscope optics ~~(SC1, SC2, SCO, M1)~~ means.

42. (*currently amended*) The fluorescence microscope of claim 37, wherein the acousto-optical ~~elements (AOM, AOTF)~~ means comprise firstly an AOM and then an AOTF in the direction of the microscope optics ~~(SC1, SC2, SCO, M1)~~ means.

43. (*currently amended*) A fluorescence microscope, comprising:

~~a~~ radiation ~~source (L1, L2, L3) which emits~~ means for emitting excitation light for irradiating a sample,

~~a~~ detection ~~device (DE, DT, NFT) for the detection of~~ means for detecting emission light emitted by the sample,

microscope optics means for directing excitation light to the sample and for directing emission light back in the direction of the radiation ~~source~~ means and the detection ~~device~~ means,

a plurality of acousto-optical ~~elements (AOM, AOTF)~~ means for separating excitation light and emission light and for diffracting the excitation light, which are so positioned between the radiation ~~source~~ means and the microscope optics means that diffracted excitation light can be introduced into the microscope optics ~~(SC1, SC2, SCO, M1)~~ means, wherein:

in the direction of the microscope optics ~~(SC1, SC2, SCO, M1)~~ means as the acousto-optical ~~elements (AOM, AOTF)~~ means are firstly provided an AOM and then an AOTF,

the emission light emitted by the sample has fractions of excitation light and fractions of wavelength-shifted fluorescence light,

excitation light emitted by the sample is deflectable by diffraction in the direction of the radiation ~~source~~ means by the acousto-optical ~~devices (AOM, AOTF)~~ means, and

wavelength-shifted fluorescence light emitted by the sample can be transmitted undiffracted through the acousto-optical ~~elements (AOM, AOTF)~~ means and is spatially separable from excitation light fractions of the emission light, and wherein:

the detection ~~device (DE, DT, NFT)~~ means is so positioned with respect to the acousto-optical ~~elements~~ means that wavelength-shifted fluorescence light transmitted undiffracted through the acousto-optical ~~elements (AOM, AOTF)~~ means is detectable by means of the detection ~~device (DE, DT, NFT)~~ means and,

the acousto-optical means is so positioned with respect to the beam path and the detection means that only undiffracted light can be detected by the detector means, and further comprising:

~~a~~ filter ~~device (LF), which~~ means for ~~the selective detection of~~ selectively detecting wavelength-shifted fluorescence light in the detection ~~device (DE, DT, NFT)~~ means ~~is~~ positioned between the acousto-optical ~~elements~~ means and the detection ~~device (DE, DT, NFT)~~ means.

44. (*previously added*) The fluorescence microscope of claim 43, wherein the fluorescence microscope is a confocal fluorescence laser microscope.

45. (*currently amended*) The fluorescence microscope of claim 43, wherein the radiation ~~source (L1, L2, L3)~~ means is a laser.

46. (*currently amended*) The fluorescence microscope of claim 28, wherein at least one ~~glass~~ optical fibre is provided for feeding in excitation light.

47. (*currently amended*) The fluorescence microscope of claim 37, wherein at least one ~~glass~~ optical fibre is provided for feeding in excitation light.

48. (*currently amended*) The fluorescence microscope of claim 43, wherein at least one ~~glass~~ optical fibre is provided for feeding in excitation light.

49. (*currently amended*) The fluorescence microscope of claim 43, further comprising at least one optical ~~element~~ means for influencing the light direction provided in at least one of an excitation beam path upstream of the acousto-optical ~~element (AOM, AOTF)~~ means and a detection beam path downstream of the acousto-optical ~~element (AOM, AOTF)~~ means to bring about improved separation of the light fractions.

50. (*currently amended*) The fluorescence microscope of claim 28, wherein:

the radiation ~~source (L1, L2, L3)~~ means is constructed as a plurality of lasers (L1, L2, L3) having different wavelengths,

a plurality of the acousto-optical ~~elements (AOM, AOTF)~~ means are provided and with each laser (L1, L2, L3) is associated at least one acousto-optical ~~element (AOM, AOTF)~~ means,

the different wavelengths by diffraction in the acousto-optical ~~elements (AOM, AOTF)~~ means can be simultaneously or individually fed into a microscope beam path~~(SC1, SC2, SCO, M1)~~ , and

wavelength-shifted emission light and excitation light having in each case a different wavelength can be transmitted undiffracted through the respective acousto-optical ~~elements (AOM, AOTF)~~ means.

51. (*currently amended*) The fluorescence microscope of claim 28, wherein the acousto-optical ~~elements~~ means comprise at least one of an AOTF and an AOM.

52. (*currently amended*) The fluorescence microscope of claim 50, wherein the excitation power of each laser (L1, L2, L3) is independently adjustable with the respective acousto-optical ~~element (AOM, AOTF)~~ means.

53. (*currently amended*) The fluorescence microscope of claim 30, wherein the acousto-optical ~~elements (AOM, AOTF)~~ means can be switched by a frequency change from a first wavelength of a first laser to a second wavelength of a second laser.

54. (*currently amended*) The fluorescence microscope of claim 28, wherein the excitation light can be introduced into the microscope optics ~~(SC1, SC2, SCO, M1)~~ means by diffraction at the acousto-optical ~~element (AOM, AOTF)~~ means in the first diffraction order.

55. (*currently amended*) The fluorescence microscope of claim 28, further comprising an excitation and detection pinhole (PH) located upstream of the microscope optics ~~(SC1, SC2, SCO, M1)~~ means.

56. (*currently amended*) The fluorescence microscope of claim 50, wherein the radiation of the plurality of lasers (L1, L2, L3) in the direction of the microscope optics ~~(SC1, SC2, SCO, M1)~~ means can be successively fed into the microscope beam path in a sequence based on decreasing wavelength.

57. (*previously added*) The fluorescence microscope of claim 28, wherein at least one of UV light, visible light and infrared light can be fed into the microscope beam path.

58. (*currently amended*) A device for feeding light into a beam path of a microscope, comprising:

a plurality of light sources ~~(L1, L2, L3)~~, which emit light of different wavelengths~~, wherein:~~ ,

detection means for detecting emission light emitted by a sample, and

a plurality of light diffracting ~~elements is provided, the light diffracting elements~~ means ~~being~~ located on a common optical axis for combining the light of the plurality of light sources ~~(L1, L2, L3)~~ and for separating excitation light and emission light, and wherein:

at least one of the light diffracting ~~element~~ means is associated ~~is~~ with each light source ~~(L1, L2, L3)~~, and ~~wherein~~ the different wavelengths by diffraction in the light diffracting ~~elements~~ means can be simultaneously or individually fed into the common optical axis and are combinable in the common optical axis, and

the light diffracting means are so positioned with respect to the beam path and the detection means that only undiffracted light can be detected by the detector means.

59. (*previously added*) The device of claim 58, wherein the microscope is a confocal fluorescence laser microscope.

60. (*currently amended*) The device of claim 58, wherein the plurality of light diffracting ~~elements~~ means comprise acousto-optical elements ~~(AOM, AOTF)~~.

61. (*currently amended*) The device of claim 58, wherein the light diffracting ~~elements~~ means are chosen from the group consisting of an AOTF and an AOM.

62. (*currently amended*) The device of claim 61, wherein the acousto-optical elements ~~(AOM, AOTF)~~ comprise firstly an AOM and then an AOTF in the direction of the microscope optics ~~(SC1, SC2, SCO, M1)~~ means.

63. (*previously added*) The microscope of claim 12, wherein the microscope is a confocal microscope.

64. (*previously added*) The microscope of claim 22, wherein the microscope is a confocal microscope.

65. (*previously added*) The microscope of claim 24, wherein the microscope is a confocal microscope.